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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/826,078	04/05/2001	Christy Mei-Chu Woo	52352-767	3860

7590

05/31/2002

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EXAMINER

DEO, DUY VU

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 05/31/2002

4

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/826,078

Applicant(s)

WOO ET AL.

Examiner

DuyVu n Deo

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 April 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Wall et al. (US 6,224,682).

Wall describes a method for depositing a nickel layer on a substrate comprising: introducing a substrate to a chamber; heating the chamber; depositing a layer of nickel on the surface of the substrate while heating the chamber (col. 3, line 7-20; col. 6, line 51-68). This chamber would be obviously must have a heating element in order to heat the chamber.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2-6, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wall.

Unlike claimed invention, Wall doesn't describe heating the chamber during the introduction of the 2nd substrate. He describes cooling the chamber and then removing the substrate out of the chamber. However, it would be obvious that Wall is describing to process only one substrate as an example. Where in a real manufacturing process, many substrates would be processed continuously; therefore, it would have been obvious to one skilled in the art to keep heating the chamber after the nickel has been deposited and the substrate is removed from the chamber in order to prepare the chamber for the next deposition of the nickel for the next substrate. This would save processing time and increases product yield.

Referring to claims 4, 6, it would be obvious to use any type of known heating element, such as a lamp, or numbers of heating elements as long as it can provide the T needed for the deposition process with an anticipation of an expected result.

Referring to claim 5, it would have been obvious to one skilled in the art that the power of the lamp would during the introduction of the substrate and during the deposition process would be depended on the desired T of the process and it would have been determined through test runs in order to obtain the optimum power of the lamp to provide the T for the deposition of nickel with an expected result.

Referring to claims 2, 8, even though he doesn't describe heating the chamber prior to or during the introduction of the substrate. However, it would be obvious for one skilled in the art that the chamber is needed to be prepared for the deposition process in which it would be heated prior to introduction of the substrate because the sooner the target T is achieved the sooner the deposition can be begun. Therefore, it would save processing time and increase product yield.

5. Claims 1, 7, 9, 10, 13, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta et al. (US 6,225,202) and Wolf et al. (Silicon Processing for the VLSI Era).

Gupta describes a method for forming nickel silicide comprising: forming a gate electrode having a gate oxide, source/drain regions, and silicon nitride sidewall spacer; introducing the substrate to a deposition chamber; depositing a nickel layer on the silicon surface by sputtering; heating the nickel layer to form nickel silicide by RTA on the gate electrode and source/drain regions; removing unreacted nickel from the substrate (col. 2-col. 3, line 35).

Unlike claimed invention Gupta doesn't describe depositing the nickel layer with the simultaneous heating of the chamber. Wolf describes the conventional process of sputtering wherein he teaches wafer heating (this would also heat the chamber) used to desorption of moisture and preheating to improve step coverage during deposition and it may be done in the sputtering chamber during deposition (page 361). Therefore, it would have been obvious for one skilled in the art to depositing the nickel in light of Wolf because Wolf further describes the sputtering process used by Gupta to deposit nickel with an anticipation of an expected result.

Wolf also describes cleaning the substrate before depositing the nickel layer. Referring to claims 13, 14, even though Gupta describes removing the unreacted nickel metal; he also describes that using wet etching, such as ammonium hydroxide, hydrogen peroxide, and water, are well known and practiced by one skilled in the art.

6. Claims 11, 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta and Wolf as applied to claim 9 above, and further in view of Chen et al. (Comparison of TiSi_2 , CoSi_2 , and NiSi for thin-film Silicon-on-Insulator Applications).

Referring to claims 11 and 12, the RTA to form nickel silicide at 550 degrees Celsius and 40s has been known to one skill in the art as taught by Chen (page 2440).

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta and Wolf as applied to claim 9 above, and further in view of Kunishima et al. (US 5,162,263).

Gupta further describes continuing processing the integrated circuit as is conventional after removal of unreacted metal. According to Kunishima shows that a conductive connection to the nickel silicide is formed without having a cap layer (col. 6, line 26-33).

8. Claims 2-6, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta and Wolf as applied to claim 1 above, and further in view of admitted prior art.

Referring to claims 2 and 8, page 2 teaches that it is well known to preheat the chamber, including sputtering chamber, to accelerate the removal of contaminants from the chamber, including water vapor and other gases from the chamber components.

Referring to claims 3 and 8, above prior art doesn't describe heating the chamber during the introduction of the 2nd substrate. However, in a real manufacturing process, many substrates would be processed continuously; therefore, it would have been obvious to one skilled in the art to keep heating the chamber after the nickel has been deposited and the substrate is removed from the chamber in order to prepare the chamber for the next deposition of the nickel for the next substrate. This would save processing time, increases product yield, and produce quality nickel layer.

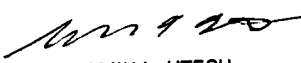
Referring to claims 4, 6, it would be obvious to use any type of known heating element, such as a lamp, or numbers of heating elements as long as it can provide the T needed for the deposition process with an anticipation of an expected result.

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Referring to claim 5, it would have been obvious to one skilled in the art that the power of the lamp would during the introduction of the substrate and during the deposition process would be depended on the desired T of the process and it would have been determined through test runs in order to obtain the optimum power of the lamp to provide the T for the deposition of nickel with an expected result.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD
May 28, 2002


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